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A decision support system for planning of flexible biogas chains

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Abstract

Decentralized biogas produced through co-digestion of biomass can play an important role in our future renewable energy mix. However the optimal design, planning and use of a biogas production chain is a daunting process. When looking into a biogas production chain one must take into account, first, the biomass availability in quantity, quality and the location, second, the energy demand in energy type, quantity and location and finally the needed machinery and infrastructure to connect them. During this process there are social, legal and environmental issues to overcome, but overall the financial aspects will mostly dictate viability. Hence, the complexity involved in linking the aforementioned aspects is difficult at most.

Currently, to the authors knowledge, there are no computer systems that can support the decision makers in the planning process of biogas production chains, while taking into consideration all of the above mentioned factors. Therefore, we addressed this issue as part of the Flexigas project [1]. In our article we introduce a software tool, called The Flexigas Simulator. It links together the geographical, financial, environmental and time dependent factors to determine the viability of converting biomass into biogas. Viability is measured in terms of Energy Returned On Energy Invested (EROEI), Carbon Footprint (GWP100) and EcoPoints (SimaPro 2013). The Flexigas Simulator that we propose is an interactive system with a multi-touch interface which facilitates the decision making process of various stakeholders. It uses geographical map interface to visualize the locations of the concerned components, and illustrates the results graphically, while keeping the underlying computations transparent to the users. The Flexigas Simulator offers an effective and efficient way of running multiple what-if scenarios – by changing some model parameters - in order to optimize the processing chain.

Sources

- The Flexigas project 2013, www.flexigas.nl
- SimaPro 2013, <http://www.pre-sustainability.com/lca-expertise>

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Our line of research needs a higher level of dissemination of the expertise of the people working on project within the industrial community. If possible we like to participate in the main flow of the conference presenting the article for Industrial audience.